Remarks

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claims 1-14 remain pending. Applicant has amended independent claims 1 and 8 to change "automation device" to "end automation device". This change is clearly supported in the original specification: "[0028] In FIG. 1, the end device is an IO module 203, although it could be any number of other automation devices." Applicant respectfully submits that no new matter has been added by this amendment.

This amendment was made to clarify that the "automation device" referred to in the claims is the "end automation device" residing on the fieldbus or I/O network 205 of Figure 1, as opposed to the PLC 202 that resides between the fieldbus and the Ethernet network 202 of Figure 1. Although Applicant believes that this would have been clear to those skilled in the art before this amendment, it is important to understand that the "end automation device" referred to in the claims could also be a PLC, as further described in paragraph [0028] of Applicant's original specification, configured as an end automation device if residing solely on the fieldbus. "For instance, the automation device could be a programmable logic controller, an IO head, an inverter, a breaker, a sensor, a vision device, a bar code reader, or any other device that may be found in an automation environment." (Applicant's specification, paragraph 0028).

In Paragraphs 4-8 of the Office Action, the Examiner rejected claims 1-14 under 35 U.S.C. § 103 as being unpatentable over Blackett in view of Johnson. The Examiner stated that Blackett teaches encapsulating information formed in one protocol in another protocol used by the information receiver, and that it is a known process for overcoming the protocol difference (e.g., col 8, lines 34-46). However, the Examiner conceded that Blackett does not specifically teach the feature of encapsulating a browser request in a Modbus type protocol. The Examiner also stated that Johnson teaches that field devices can be embedded with a web server so as to communicate with an Internet browser (i.e., over an HTTP protocol), wherein the Modbus protocol is included as one of the fieldbus protocols, and that the encapsulation technique is recommended for transmitting requests written in local protocol to a remote receiver that uses a

different protocol (e.g., paragraphs 9, 20, and 154 of Johnson). The Examiner concluded that it would have been obvious to have an embedded web server in Blackett's slave devices because (1) embedding a web server in a field device is well known in the industrial field control, and (2) by doing so, it would greatly simplify the protocol processing tasks at Blackett's master device. Applicant respectfully traverses this rejection.

Blackett, U.S. Patent No. 6,792,337, describes a power management architecture for an electrical power distribution system including master intelligent electronic devices having the capability to monitor and control attached slave devices, and provide capability to communicate between multiple devices in a variety of communications protocols. The master devices have web server capabilities to permit the user to view data over an open Internet protocol, such as HTTP. Master protocols include Modbus protocols and ION protocols. Figure 7 of Blackett illustrates a master device 700 coupled to a first network 725 using the Modbus protocol and a second network 730 using the ION protocol, and their associated slave devices.

The Examiner referred to Figure 7 of Blackett, and in particular, col. 8, lines 34-46 to describe Blackett's teaching of encapsulating the request message. The relevant portion of this passage states "It will be appreciated by one skilled in the art that a master protocol can be transmitted over TCP/IP by wrapping/encapsulating it in the appropriate manner, however a master protocol master can also communicate directly over a particular media without using TCP/IP." This is the only place in Blackett that uses the words "encapsulate" or "wrap". Moreover, Applicant cannot find where Blackett actually teaches how a master protocol is actually encapsulated into another protocol for transmission over TCP/IP. It appears that Blackett only suggests that encapsulation is known in the art.

Furthermore, column 16, lines 64 et seq. of Blackett state "As described earlier the device circuitry converts and processes the data or commands from the proprietary protocol such as the Modbus protocol or the ION protocol, to a third common Internet network open protocol, such as HTTP." This protocol conversion technique is mentioned several times throughout the Blackett reference. Protocol conversion appears to be the primary mechanism for gathering data from slave devices in Blackett.

Nowhere does Blackett suggest any need for a web server in any slave device, contrary to that suggested by the Examiner. Instead, its master devices have a web server, and protocol conversion appears to be the mechanism to communicate with the slave devices on a fieldbus. Furthermore, Blackett's Figure 9 suggests a different solution to simplifying the protocol processing tasks of the master devices: "[0081] It will also be appreciated that a slave device can also contain master device functionality. A device with master/slave functionality, as shown in FIG. 9, utilizes master functionality to aggregate and process data within sub-networks. ... The master device 600 [sic (900)] is configured to poll the data from only the master/slave devices 905, 955, thereby reducing the amount of connections and processing power that is required by the master device 900." Figure 9 does not suggest embedding a web server in the end devices.

Johnson, U.S. Patent Application No. US 2004/0254648A1, describes a process control system using networked field and control devices that provide a virtual machine environment. Figure 1 of Johnson shows control devices "coupled, via one or more networks 48 that are, preferably, IP-based such as, by way non-limiting example, Ethernets." (Johnson, paragraph 40). Figure 2 of Johnson, however, shows a more particular embodiment wherein one or more field devices 62 and 64 are coupled to one or more networks 66 and 68. "Native controller 60 (corresponding, for example, to controller 36) executes control algorithms to control associated non-native field devices 64, e.g., via any variety of commercial and/or proprietary field bus 70 hardware and protocols." (Johnson, paragraph 46). Furthermore, native field device 62 is a sensor, actuator, or other field device. (Johnson, paragraph 47).

Figure 2 of Johnson shows that "Java Enabled Field Device" 62 includes a web server. Hence, the Examiner is correct in that Johnson teaches that a web server can be embedded within a field device so as to communicate with an Internet browser. However, two important points need to be noted. First, Johnson only teaches that a field device connected to the IP-based network has a web server. Specifically, only field device 62 in Figure 2 shows that a web server is included. To the contrary, field device 64, connected to the fieldbus 70, is not shown to include a web server. Instead, its controller 60, connected to the IP-based network 68, is shown in Figure 2 to have a web server. This is consistent with the teaching of Johnson. Second, there is no teaching in Johnson of communicating directly between the web browser and field device

64 of Figure 2 over the fieldbus 70. Instead, Johnson states "... the controller 60 utilizes a embedded operating system that supports web serving and the JVM." (Johnson, paragraph 0046). This is also consistent with the teaching of Johnson, as HTTP messages are not being encapsulated into Modbus messages.

The Examiner recited paragraph 154 of Johnson as an example of the Johnson Modbus-into-HTTP encapsulation technique. Applicant has fully considered the teaching of Johnson, and particular this paragraph 154 and the others mentioning the word "'encapsulating", but cannot understand how this purported encapsulation works. It is not described in sufficient detail in the Johnson description. Applicant respectfully submits that this passage is not enabling and therefore not a proper basis of rejection. If the Examiner maintains this basis of rejection, Applicant requests a more detailed explanation and a fair chance to respond.

In sum, any combined teachings of Blackett and Johnson cannot render obvious Applicant's claims for at least the following reasons:

(1) Any such proposed combination still lacks the claimed elements of (a) sending a request message from said web browser to a process that encapsulates said request message in a Modbus type protocol; (b) transmitting said request message to said end automation device; and (c) responding to said request message by the automation device with a reply message using the Modbus type protocol. Neither reference even suggests a need for encapsulating web browser request messages into Modbus type messages.

(2) Blackett and Johnson both suggest encapsulating a fieldbus protocol message, such as a Modbus message, into an IP-based protocol message, such as an HTTP message. This is essentially the opposite of Applicant's invention, e.g., of encapsulating an HTTP message within a Modbus message. This teaching away would not lead one skilled in the art to combine the Blackett and Johnson references (particularly with those standard IP-based network configurations) to combine these references to solve the problems described by Applicant (while knowing that the Modbus protocol is widely used in factory automation applications).

(3) Any such proposed combination of Blackett and Johnson would not work in Applicant's legacy Modbus-type system topologies and applications currently deployed in the field, without major upgrades to Ethernet-based topologies, which would be cost and time prohibitive in most circumstances. Applicant's claimed invention is directed to solving this problem.

Applicant's dependent claims include all the limitations of their respective independent claims, and thus the same reasons would apply regarding Blackett and Johnson. Therefore, Applicant respectfully submits that the dependent claims are also patentable over the references of record.

In light of the foregoing Amendments and Remarks, Applicant respectfully submits that all claims are now in condition for allowance. Favorable consideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

Respectfully submitted,

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